HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Hoodsport Fall Chinook Fingerling Program
Species or Hatchery Stock:	Hood Canal Fall Chinook
Agency/Operator:	Washington Department of Fish and Wildlife
Watershed and Region:	Hood Canal Puget Sound
Date Submitted:	, 2002
Date Last Updated:	August 20, 2002

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Hoodsport Hatchery Fall Chinook - Fingerling Program

1.2) Species and population (or stock) under propagation, and ESA status.

Hood Canal Fall Chinook (*Oncorhynchus tshawytscha*)

1.3) Responsible organization and individuals

Name (and title):	Manuel Farinas, Operations Manager	
	Denis Popochock, Complex Manager	
Agency or Tribe:	Washington Department of Fish and Wildlife	
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

In addition to WDFW production, the Hood Canal Salmon Enhancement Group (HCSEG) and Long Live the Kings (LLTK) operate cooperative projects that produce fall chinook fingerlings or unfed fry in Hood Canal.

Hoodsport Hatchery operates under *U.S. v. Washington,* the Puget Sound Salmon Management Plan and the Hood Canal Salmon Management Plan between WDFW and the Point No Point Treaty Council (PNPTC) which includes the Skokomish, Port Gamble S'Klallam, Jamestown S'Klallam, and Lower Elwha S'Klallam tribes. The Co-management process requires that both the State of Washington and the relevant Puget Sound tribes agree on the function and purpose of each hatchery program and on production levels. Guidelines for production at Hood Canal facilities are set out in the Hood Canal Salmon and Steelhead Production 1996 MOU and the Future/Current Brood Document.

1.4) Funding source, staffing level, and annual hatchery program operational costs.

Funding for fingerling production at Hoodsport Hatcheries is provided through the State General Fund.

There is no funding for the citizen volunteer or educational co-op projects.

1.5) Location(s) of hatchery and associated facilities.

Hoodsport Hatchery: Located at the mouth of Finch Creek (16.0222), which flows into Hood Canal in the town of Hoodsport, Washington. Basin name: Hood Canal.

1.6) Type of program.

Isolated harvest.

1.7) Purpose (Goal) of program.

Augmentation

The goal of Hood Canal fingerling fall chinook production is to provide fish for harvest opportunity.

1.8) Justification for the program.

This program will be operated to provide fish for harvest while minimizing adverse effects on listed fish. This will be accomplished in the following manner:

1. Release fingerling smolts with expected brief freshwater residence.

2. Beginning with the 1999 brood, release excess chinook fry, if any, into landlocked lakes rather than into Purdy or Finch Creeks, as in the past.

1.9) List of program "Performance Standards".

1.10) List of program "Performance Indicators".

Performance Standards and Indicators for Puget Sound **Isolated Harvest** Chinook programs.

Performance Standard	Performance Indicator	Monitoring and Evaluation Plan
Produce adult fish for harvest	Survival and contribution rates	Monitor catch and cwt data
Meet hatchery production goals	Number of juvenile fish released-**3,000,000 fingerlings**	Future Brood Document (FBD) and hatchery records

Manage for adequate escapement where applicable	Hatchery return rates	Hatchery return records
Minimize interactions with listed fish through proper broodstock management and mass marking. Maximize hatchery adult capture effectiveness. Use only hatchery fish	Number of broodstock collected - **2,220 adults**	Rack counts and CWT data Spawning guidelines Hatchery records Spawning guidelines Hatchery records
	Stray Rates	
	Sex ratios	
	Age structure	
	Timing of adult collection/spawning - **August 1 thru September**	
	Adherence to spawning guidelines - **1:1 with 5 fish pools**	
	Total number of wild adults passed upstream - **none (see section 2.2.3)**	
Minimize interactions with listed fish through proper rearing and release strategies	Juveniles released as smolts	FBD and hatchery records FBD and historic natural outmigration times FBD and hatchery records CWT data and hatchery records (marked vs unmarked)
	Out-migration timing of listed fish / hatchery fish **April thru early June/May**	
	Size and time of release **60-80 fpp/ May release**	
Maintain stock integrity and genetic diversity	Effective population size	Spawning guidelines
	Hatchery-Origin Recruit spawners	

Maximize in-hatchery survival of broodstock and their progeny; and Limit the impact of pathogens associated with hatchery stocks, on listed fish	Fish pathologists will monitor the health of hatchery stocks on a monthly basis and recommend preventative actions / strategies to maintain fish health	Co-Managers Disease Policy Fish Health Monitoring Records
	Fish pathologists will diagnose fish health problems and minimize their impact	
	Vaccines will be administered when appropriate to protect fish health	
	A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings	
	Fish health staff will present workshops on fish health issues to provide continuing education to hatchery staff.	
Ensure hatchery operations comply with state and federal water quality standards through proper environmental monitoring	NPDES compliance	Monthly NPDES records

Benefits addressed:

1) Achieve broodstock collection/eggtake goals to provide fish for stable, predictable fisheries.

2) Communicate within WDFW and with the tribes, citizen groups, schools, private citizens and federal agencies regarding program goals and production objectives.

3) Meet Endangered Species Act recovery requirements and Wild Salmonid Policy guidelines.

4) Provide fish carcasses from Hoodsport Hatchery for Hood Canal nutrient enhancement programs.

Risks addressed:

1) Reduce hatchery broodstock collection impacts on wild fish by; initiating mass marking of hatchery chinook and; returning wild fish entering the hatchery back to the river or stream.

2) Reduce interactions between hatchery and wild juvenile fish.

3) Maintain hatchery stock integrity and genetic diversity by; continuing the policy of releasing no out-of-basin fall chinook from Hood Canal hatcheries or into Hood Canal streams and; collecting sufficient broodstock to meet or exceed numbers of fish required to minimize effects of genetic drift and; insuring that bias in taking broodstock is minimized, e.g., by taking fish throughout the run, by avoiding selection for size, incorporating some jacks into the broodstock.

4) Meet disease prevention and control standards in the Co-Manager's Salmonid Disease Control Policy.

5) Meet or exceed state and federal water-quality standards for hatchery discharge.

1.10.1) "Performance Indicators" addressing benefits.

1) Monitor the number of returning adults and eggtakes weekly to determine whether goals are being met.

2) Supply chinook carcasses from Hoodsport Hatchery to the Forest Service nutrient enhancement program.

3) Publish agreed-to production plans (Future Brood Document) with PNPTC tribes and other stakeholders.

4) Acquire needed permits (e.g. approved HGMP) to ensure that the Hood Canal fingerling fall chinook program satisfies ESA recovery requirements for listed fish.

1.10.2) "Performance Indicators" addressing risks.

1. Report numbers and disposition of mass-marked hatchery-origin chinook and unmarked chinook returning to the facility.

2. Document spatial and temporal distribution of hatchery chinook in the nearshore marine areas immediately after release. Adjust release strategies, if needed, to reduce interactions with wild fish.

3. Monitor run timing, size, sex ratio and other characters that might be subject to inadvertent directional selection during broodstock selection to ensure that the population mean for these characters is not being altered.

4. Conduct genetic sampling once per generation to look for undesirable genetic effects (e.g. loss of alleles).

5. Conduct monthly visits by fish health specialists, more frequent checks if needed. Complete all required fish health reports documenting compliance with the Co-Manager's Salmonid Disease Control Policy.

6. Conduct water-quality testing and report results as required by the Washington Department of Ecology to document compliance with water-quality testing.

1.11) Expected size of program.

1.11.1) Proposed annual broodstock collection level (maximum number of adult fish).

For Hoodsport Hatchery, the egg-take goal is 3.6 million fall chinook eggs. Assuming a fecundity of 4,500 eggs per female and a 60% male / 40 % female sex ratio, and a prespawning mortality of < 5%, the number of adults required to meet the eggtake goal would be about 2,100. Adults in excess of escapement goals will be killed and sold.

1.11.2) Proposed annual fish release levels (maximum number) by life stage and location.

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		
Fry		
Fingerling	Finch Creek (16.0222)	3,000,000
Yearling		

1.12) Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

Hatchery program fingerling survival rates have averaged .26% (89-94 broodyears). Since 1988, hatchery returns have been large enough to meet egg-take needs of 3.6 million eggs in 8 of 12 years.

The escapement levels for the last 5 years to the Hood Canal have averaged 1,112

(includes Skokomish, Hamma Hamma, Dosewalips and the Duckabush rivers).

Broodstock levels back to the hatchery rack for brood years 1995 through 2001 were 3,190, 4,653, 8,342, 10,057, 10,976, 11,646 and 4,578, respectively.

1.13) Date program started (years in operation), or is expected to start.

1953 .

1.14) Expected duration of program.

Ongoing

1.15) Watersheds targeted by program.

Finch Creek (16.0222) in Hood Canal (14.xxxx).

1.16) Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

None

SECTION 2. PROGRAM EFFECTS ON ESA-LISTED SALMONID POPULATIONS.

2.1) List all ESA permits or authorizations in hand for the hatchery program.

None

2.2) Provide descriptions, status, and projected take actions and levels for ESA-listed natural populations in the target area.

2.2.1) Description of ESA-listed salmonid population(s) affected by the program.

Puget Sound ESU fall chinook (Hood Canal fall chinook stock (WDF 1993)): We have no information on the adult age structure, sex ratio, size range or smolt distribution and emigration timing of wild chinook in Hood Canal streams. We do not know if Hood Canal hatchery-origin fingerling fall chinook interact with wild Hood Canal chinook. Hood Canal wild chinook are thought to emigrate mainly as sub-yearlings, probably from April through early June. The summer flows in the South Fork Skokomish River may be too low to support chinook through the summer, though some areas in the Lower North Fork do have sufficient water (C. Baranski, WDFW, personnel communication, March 2000). Hood Canal fall chinook spawn from mid-September through October with a peak in mid-October (WDFW and WWTIT 1994). Chinook spawning occurs in the mainstem Skokomish River, the lower South Fork Skokomish and tributaries such as Vance Creek,

lower North Fork Skokomish and tributaries, and the lower reaches (below anadromous barriers) of Lilliwaup Creek, John Creek, the Duckabush, Dosewallips, Big and Little Quilcene Rivers, and the lower Union, Tahuya and Dewatto Rivers. Chinook spawning in many of these streams may be largely the result of hatchery releases.

Tissue samples of naturally-spawning fall chinook are being collected in Hood Canal streams for genetic analysis. Preliminary analysis of Skokomish basin adult spawners and juveniles suggests that the naturally-spawning chinook are largely, though perhaps not entirely, of George Adams and Hoodsport hatchery origin (memo from A. Marshall, WDFW, dated 4 May 1999 and 31 May 2000).

Because there is no specific information on wild smolt temporal and spatial distribution in Hood Canal streams, the extent to which they might interact with hatchery chinook released locally is unknown.

Hood Canal Summer Chum:
Available data have been compiled in Tynan (1997) and the draft Hood Canal Summer Chum Conservation Initiative (WDFW and PNPTC).

Puget Sound Bull Trout (South Fork Skokomish stock (WDFW 1998)):
There is little or no information on adult age class structure, sex ratio, juvenile life history strategy or smolt emigration timing. Hood Canal Ranger District (Olympic National Forest) staff recently conducted a radio-tagging study of (presumed) bull trout in the South Fork Skokomish River (Ogg and Taiber 1999). The objectives of the study were to examine seasonal migration patterns and to identify spawning grounds and spawning times. In addition, Forest Service staff have been conducting trapping, snorkeling and electrofishing surveys for bull trout in the South Fork. They believe that fluvial and resident life history forms are present. There is no evidence from their work of an anadromous life history form, though anadromous fish may be present. Sexually mature fluvial fish range from 38 to 59 cm. During the course of the telemetry study, spawning migration activity in fluvial fish began in late October when the water temperature dropped below 7°C and river flow increased. Spawning time appears to be from late October through late November. Spawning grounds have tentatively been identified in the mainstem South Fork from RM 18 through RM 23.5 and in Church, LeBar and Brown Creeks. Juvenile rearing areas include, but should not be considered restricted to, RM 19 through RM 23.5.

In general, chinook are not seen above the Gorge of the South Fork beginning at RM 7 (C. Baranski, WDFW, personnel communication, March, 2000) so interactions between hatchery chinook and bull trout are not expected unless fluvial or anadromous fish, if any, move downstream into the lower South Fork or the mainstem Skokomish River.

-Identify the ESA-listed population(s) that will be <u>directly</u> affected by the program.

None

-Identify the ESA-listed population(s) that may be incidentally affected by the program.

Puget Sound chinook, Hood Canal summer chum and Puget Sound bull trout.

2.2.2) Status of ESA-listed salmonid population(s) affected by the program.

- Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds

This has not been determined for the ESA listed population. WDFW SASSI document (1992) lists the following:

Summer/Fall chinook stock in Hood Canal is *healthy.*

Hood Canal summer chum:

1. Union River are *Healthy*
2. Lilliwaup and Jimmycomelately Creeks are *critical*
3. Hamma Hamma, Duckabush, Dosewallips, Big/Little Quilcene, and Snow Creek are *Depressed*

Puget Sound bull trout in Hood Canal are *viable.*

Source: Summer Chum Salmon Conservation Initiative (SCSCI).

- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.

See section 1.12 for smolt to adult survival for this group for the hatchery program.

No estimates of productivity are available for Puget Sound chinook or for Puget Sound Bull Trout in the Hood Canal region.

No good estimates of Hood Canal summer chum productivity are available because age data are not available. Recruit-per-spawner estimates done by WDFW, the NWIFC and PNPTC range from 1.5 to 1.8, but none of these are reliable at present (J. Ames, WDFW, personnel communication, February 2000).

- Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.

Table X. 1988-1998 spawner abundance data for Hood Canal fall chinook, Hood Canal summer chum and Lake Cushman Bull Trout/Dolly Varden. Chinook data are from the 1998 WDFW chinook run reconstruction. Summer chum data are from J. Ames (WDFW, personal communication). Bull trout data are from WDFW (1998) through

1996 and from D.Collins (WDFW, personnel communication) thereafter.

Year	Fall Chinook	Summer Chum	Bull Trout/Dolly Varden
1988	2,853	2,967	152
1989	1,425	598	174
1990	724	429	299
1991	1,858	746	299
1992	940	1,954	285
1993	1,172	712	412
1994	1,072	2,050	281
1995	1,999	8,971	250
1996	1,028	19,683	292
1997	492	8,420	No data collected
1998	1,803	3,407	119[1]
1999	3,020 (prelim. est.)	3,884	90[1]

- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

Analysis of the 1988, 89, 90, 91, 92, 93, 94 and 95 broods showed no detected spawning ground strays outside the GDU Within the same GDU the stray rate risk rating is "Low" per the WDFW Hatchery Risk Assessment Worksheet, Version 2, 11/2/00.

In recent years hatchery-origin chinook, identified by adipose-fin clips and scale patterns, have been recovered from spawning grounds in the mainstem Skokomish River during sampling for genetic analysis. In 1998, 61 chinook spawners were sampled, ten of which were coded-wire tagged. They originated from George Adams hatchery (n=3), Hoodsport Hatchery (n=2), Long Live the Kings releases from Rick's Pond (n=4) and the now - defunct Sund Rock net pens (n=1). Seven of these fish had been released as yearlings and three as fingerlings. Since George Adams releases only fingerlings, the yearlings would probably have come from the Long Live the Kings project, Hoodsport Hatchery or the now-defunct net pens . Scale analysis of the untagged adults in the genetics sample

[1] Counts were incomplete due to high water (D.Collins, personal communication, February, 2000)

showed that an additional 16 fish had hatchery yearling scale patterns. Thus hatchery-origin fish comprised at least 43% of the sample. More fish in the sample may have been of hatchery origin, but chinook released as fingerlings would have scale patterns indistinguishable from those of wild chinook, which outmigrate mainly as fingerlings.

There is high potential for George Adams chinook released from Rick's Pond and from the now defunct net pen programs in lower Hood Canal to stray because they were released from sites to which they cannot return.

2.2.3) Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take

- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.

Broodstock collection for Hoodsport fall chinook may result in take of listed Puget Sound fall chinook through capture at the trap on Finch Creek from August through October. Entry into the trap may result in injury to listed chinook. Listed wild chinook cannot be distinguished at this time from unmarked hatchery fish. Chinook are not normally passed up Finch Creek to spawn. The principal effect of this take is to remove listed chinook from the wild spawning population in other Hood Canal streams. The risk of a take is unknown because the number of listed chinook entering the trap is unknown at this time.

Chinook spawner surveys in Hood Canal streams may result in take (harassment) of wild Hood Canal chinook. The WDFW contact for Hood Canal-area spawner surveys is Thom Johnson (johnsthi@dfw.wa.gov).

- Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.

Because hatchery-origin and listed wild chinook cannot generally be distinguished in the trap or the adult holding pond, we do not know the numbers of listed wild chinook captured, injured or killed at Hoodsport.

-Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).

Annual take of listed wild Puget Sound chinook cannot be quantified since they cannot be distinguished from unmarked Hoodsport Hatchery chinook. The likely sources of take resulting from Hoodsport Hatchery operations are broodstock collection, injury or mortality during incubation and rearing, injury or mortality during egg or fry transport to

school or other co-operative programs, injury or mortality during rearing in co-operative programs, injury or mortality during on-station or off-station release.

Worst-case scenarios would include hatchery broodstock collection which consists only of listed wild fish, then subsequent loss of the all progeny of wild fish through catastrophic flooding, equipment failure or disease.

- Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

Because take levels cannot be quantified, contingency plans to limit take to pre-determined numbers have not been developed at the Hoodsport facility.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the NPPC *Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

The Hoodsport on-station fall chinook program is conducted in a manner consistent with the Hood Canal Summer Chum Conservation Initiative. Specifically, chinook are not released until after April 1 in order to reduce potential interactions with listed Hood Canal summer chum. There are no summer chum in the Skokomish River. Those from Lilliwaup Creek are expected to migrate to salt water in February and March and then to swim seaward quickly (Tynan 1992). They are expected to clear the area well before release of Hoodsport fingerling chinook in May. WDFW considers that both juveniles and returning adults from the on-station program pose low risk for competition or predation to summer chum (Tynan 1999).

3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

This HGMP is consistent with relevant standing orders and agreements. The Puget Sound Salmon Management Plan (PSSMP) and the Hood Canal Salmon Management Plan (HCSMP) are federal court orders that currently control both the harvest management rules and production schedules for salmon in Hood Canal under the *U.S. v. Washington* management framework. The parties to the SCSCI recognize that it may be necessary to modify these plans in order to implement the recommendations that will result from the SCSCI. However, the provisions of the PSSMP and HCSMP will remain in effect until modified through court order by mutual agreement.

3.3) Relationship to harvest objectives.

Tribal and non-Indian commercial and recreational fisheries directed at fall chinook and other species produced through WDFW hatchery releases will be managed to minimize incidental effects to listed chinook salmon and summer chum salmon. Time and area, gear-type restrictions, and chinook and summer chum release requirements will be applied to reduce takes of listed salmon in the Hood Canal mainstem, extreme terminal marine area, and river areas where these fisheries directed at other hatchery species occur. Compliance with the fisheries management strategy defined in the SCSCI will lead to fisheries on WDFW hatchery-origin stocks that are not likely to adversely affect listed chinook or listed summer chum.

Each year state, federal and tribal fishery managers plan the Northwest's recreational and commercial salmon fisheries. This pre-season planning process is generally known as the North of Falcon process, which involves a series of public meetings between federal, state, tribal and industry representatives and other concerned citizens. The North of Falcon planning process coincides with meetings of the Pacific Fishery Management Council, which sets the ocean salmon seasons at these meetings.

For example, during 2000 as an outcome of the North of Falcon process, the state/tribal Puget Sound Chinook Harvest Management Plan (enclosed in letter from Billy Frank, Jr., NWIFC and Jeff Koenings, WDFW to Will Stelle, NMFS, dated February 15, 2000) contained proposals for the 2000/2001 fishing season. In Hood Canal, the proposed fisheries are designed to target George Adams Hatchery chinook while minimizing catch of wild chinook.

For the 2001/2002 season, the co-manager's have prepared a Harvest Management Plan for Puget Sound Chinook Salmon. The Plan states specific objectives for harvest of the 15 Puget Sound management units, the technical bases for these objectives, and procedures for their implementation. The Plan assures that the survival and recovery of the Puget Sound ESU will not be impeded by fisheries-related mortality. The Plan is being submitted with the expectation that NMFS will reach a finding, based on the conditions stated in the 4(d) rule, that fisheries-related take in Washington waters is exempt from prohibition under Section 9 of the ESA. NMFS is/has reviewing/ed the Plan.

3.3.1) Describe fisheries benefitting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

The program at Hoodsport has contributed to the Puget Sound sport fisheries; Canadian Vancouver Island, Georgia Strait and Strait of Juan de Fuca sport fisheries; Strait of Juan de Fuca and Hood Canal treaty net fisheries and the Strait of Juan de Fuca treaty troll fishery

Hoodsport chinook have also been caught in Alaska troll fisheries, the Canadian West Coast Vancouver Island troll fishery, the Washington ocean treaty troll, ocean non-treaty troll and ocean sport fisheries and Oregon troll fisheries.

For the Skokomish and Mid-Hood Canal management units (MU), during the recovery period, pre-terminal fisheries in southern U.S. areas (SUS) will be managed to ensure a pre-terminal exploitation of 15% or less, as estimated by the FRAM model. If the recruit abundance is insufficient for each MUs goal to be met, additional terminal fishery management measures will be considered

The NMFS Section 7 consultation on the 2000/2001 PFMC, Fraser Panel and Puget Sound marine and freshwater fisheries will resulted in approval of the fisheries proposed in the Puget Sound Chinook Harvest Management Plan. NMFS is currently reviewing the Harvest Management Plan for Puget Sound Chinook Salmon prepared by the co-managers prior to the 2001/2002 season.

3.4) Relationship to habitat protection and recovery strategies.

Hood Canal chinook Limiting factors analyses have not been completed for Hood Canal natural chinook stocks and factors for decline and recovery are not available. However, since listed chinook and listed summer chum utilize similar habitats, habitat protection and recovery strategies designed to recover summer chum (see below) will also aid in the recovery of listed Hood Canal chinook.

The principle chinook streams in Hood Canal, the Skokomish, Hamma Hamma, Duckabush, Dosewallips and Big Quilcene rivers are on the westside of Hood Canal. They provide spawning and rearing habitat only in the lower river sections with relatively low gradients. Gradients rapidly become steep with impassable waterfalls, so most of these rivers are not accessible to chinook. All of these rivers, especially the Skokomish and Big Quilcene have suffered damage from human activities (dams, roads, logging, diking, agriculture and development) which have exacerbated natural summer low flows, winter flooding, streambed scouring and sediment deposition due to unstable soils and slopes. Large woody debris is lacking in most areas used by chinook as a result of forest practices. In the Skokomish, the Cushman hydropower project on the North Fork has reduced stream flow in the Skokomish by about 40% and has altered the normal pattern of sediment delivery to the estuary with the result that eelgrass has been lost (WDFW and WWTIT 1994). Gravel aggradation and removal have been problems in the lower Big Quilcene.

Summer chum Summer chum supplementation, habitat restoration and management measures are integrated as presented in the Summer Chum Salmon Conservation Initiative (WDFW and PNPTT, 2000). The SCSCI provides a standardized approach to determine freshwater and estuarine limiting factors in each summer chum watershed. Habitat factors for decline and recovery for each watershed are described. In addition, at the summer chum ESU scale, protection and restoration strategies for each limiting factor for decline are provided. The goal of the habitat protections and restoration strategy is to maintain and recover the full array of watershed and estuarine-nearshore processes critical to the survival of summer chum across all life stages. Hood Canal summer chum in westside Hood Canal streams (Lilliwaup Cr., Hamma Hamma, Duckabush, Dosewallips, Big Quilcene and Little Quilcene are affected by much the same habitat conditions as

Hood Canal chinook, especially by habitat perturbations such as diking, streambed instability/gravel aggradation in the lower stream reaches. On the eastside, Hood Canal summer chum streams such as the Union River and Big Beef Creek are low elevation, low gradient streams which are being heavily impacted by rapid development on the Kitsap Peninsula. Logging and associated road construction have historically created conditions which increased sediment delivery to streams and reduced the supply of large woody debris to streams.

Bull Trout Bull trout in the Hood Canal region are found in the South Fork Skokomish, Lake Cushman and the upper North Fork Skokomish above Staircase Falls. The condition of the South Fork is poor, as mentioned above. Lake Cushman is now a reservoir and the water level in the one-half mile of the North Fork Skokomish just above the reservoir fluctuates too much to provide stable spawning habitat. Further, the upper and lower Cushman dams have eliminated the anadromous life history form from the North Fork. However, most of the North Fork above Lake Cushman is in the Olympic National Park and the habitat is essentially pristine.

Habitat Protection Efforts and Probable Benefits:

Habitat protection efforts include the Northwest Forest Plan, adopted by the Forest Service and the Bureau of Land Management in the Northwest in 1994. The plan requires increased stream buffers to protect stream habitat for salmonids and limits road construction and some forms of logging on steep/unstable slopes. Most of the Olympic National Forest is in Late Successional Reserves which limits logging to thinning in stands under 80 years old and severely limits or prohibits logging in older stands. The Forest Service is updating road inventories and embarking on a long-term program to improve or close some of the roads which pose the greatest threats to slope stability and streams. Within Washington State, the Forests and Fish Report, prepared by the USFWS, NFMS, EPA, Office of the Governor of the State of Washington, WA DNR, WDFW, WA DOE, the Colville Tribes, Washington counties, and timber industry groups, was accepted by Washington Legislature in 1999. The emergency forest practices rules which were developed from the Report will result in some improvements in state and private forest land management including increased stream buffers and some reduction in logging in riparian areas and unstable upslope areas. Both the federal and state and private forest plans will result in habitat improvements, but are far from ideal for fish. The resulting improvements in fish habitat, such as increased large woody debris in streams, may not be realized for decades given the very poor current conditions of many fish-bearing streams and their riparian areas.

3.5) Ecological interactions.

Summer Chum The SCSCI provides an assessment of risks to summer chum juveniles and adults posed by the production of Hoodsport fall chinook, summer chum risk averse measures to implement, and monitoring and evaluation measures to be applied to minimize any risks.

Fall Chinook The risks and benefits posed by hatchery-origin juvenile chinook to wild juvenile chinook will depend on the number, size, release time and stream residence time of the hatchery fish. Hoodsport hatchery releases approximately 3.0 million fingerling smolts annually and production will be managed to minimize potential adverse effects to listed fall chinook.

Competition and Predation: Hoodsport Chinook smolts are released at a size of about 80 to 100 mm in May when wild Skokomish smolts are expected to be about 60 to 80 mm long (D. Seiler, WDFW, personal communications, February, 2000). The USFWS (1994) has suggested that juvenile salmonids can consume fish which are one-third or less their own body length. Given this rule of thumb and approximate sizes of hatchery and wild fish at the time Hoodsport Hatchery chinook are released, predation by hatchery smolts is not expected to be a significant problem.

The numbers of wild chinook smolts have been estimated for the Skokomish basin and all of Hood Canal and are compared with numbers of hatchery chinook released in the table below.

Table 22. Comparison of wild and hatchery chinook smolts in the Skokomish River and in all of Hood Canal. Hatchery chinook include those released from George Adams, Hoodsport, Long Live the Kings, and the U of W at Big Beef Creek.

Area	Wild Smolts[1]	Hatchery Smolts	Hatchery Yearlings
Skokomish River	104,400	3,830,000	120,000
Hood Canal Streams	132,000	3,310,000[2]	250,000

[1]Wild smolt numbers were estimated by averaging the 1995-1998 wild escapements in Hood Canal, halving that number to estimate the number of female spawners, applying a fecundity of 4,000 eggs per female (Bill Tweit, WDFW, personal communication) to estimate the total number of eggs produced, then applying a freshwater survival rate of 5% (Bill Tweit, WDFW, personal communication) to the egg estimate to estimate the number of surviving smolts.

[2]Includes 200,000 chinook released into Big Beef Creek by the University of Washington, 110,000 chinook released into the Hamma Hamma by Long Live the Kings, and 3,000,000 fingerlings released into Finch Creek by WDF&W.

The Species Interaction Working Group (SIWG) (1984) categorized various risks to wild salmon species and steelhead from hatchery-origin salmon species and steelhead. Their assessment of risks to wild chinook from hatchery chinook are summarized below.

Table. Risks posed by hatchery-origin chinook to wild chinook. Data from SIWG

(1984).

- Type of Risk	- Level of Risk
Freshwater predation	Unknown *
Freshwater competition	High *
Early marine predation	Unknown
Early marine competition	High

* Note: There is no freshwater estuary on Finch Creek. The hatchery outfall is directly on Hood Canal so there is no freshwater residency for Hoodsport chinook.

The high risk of competition assumes significant temporal and spatial overlap between hatchery and wild juvenile chinook and increases when numbers of hatchery fish released are far larger than numbers of wild fish (SIWG 1984). We have no information on hatchery-wild overlaps in the Skokomish basin or in the waters of Hood Canal. Clearly, the number of juvenile hatchery chinook greatly exceeds the estimated number of wild juveniles in the Skokomish basin and throughout Hood Canal which may increase the risk of competition or attraction of fish and avian predators.

Releases of hatchery chinook may confer some benefits to wild chinook. If hatchery and wild chinook juveniles occupy the same areas of Hood Canal at the same time, the large excess of hatchery fish may provide wild chinook with some protection from fish and avian predators.

Behavior modification: If large numbers of hatchery chinook are released into watersheds containing younger and/or smaller wild juveniles, they can stimulate premature outmigration in wild fish via a Pied Piper effect (Hillman and Mullan 1989). Premature outmigration can reduce survival of wild fish because they would be smaller than normal size, making them more vulnerable to predation and they may not have completed the physiological changes required to adapt to life in salt water. We do not know if this is a concern in the Skokomish basin.

Disease Transmission: It is possible that hatchery fish which have been infected by transmissible pathogens or effluent from hatcheries with sick fish could infect wild fish. Hatchery effluent is not tested for pathogens, so we do not know if Hoodsport Hatchery is releasing pathogens into the environment. However, disease transmission from hatchery to wild fish does not appear to occur routinely, possibly because pathogen spread does not occur as readily in less crowded wild fish as in hatchery fish (Tynan 1999).

Adult Interactions: The ecological interactions between wild and hatchery adult chinook which are of special concern are competition for spawning areas and competition for mates. We have no specific information on possible competition. We know (see Section 2.2.2 above) that Hoodsport Hatchery chinook do stray onto wild spawning grounds in

the Skokomish basin, however, we do not know to what extent they compete with wild chinook.

Bull Trout: We have no information on interactions between Hoodsport Hatchery chinook and wild bull trout in the Skokomish (the only watershed in the Hood Canal currently known to have native char). The risk of competition between hatchery chinook juveniles and bull trout is unknown. Presumably, competition can occur where wild and hatchery fish overlap, and space or food are limiting, but juvenile distribution of bull trout in the South Fork Skokomish is not known in detail. South Fork Skokomish bull trout are found overwintering as far down as the confluence with the North Fork (L. Ogg, USFWS, Hood Canal Ranger District, personal communication, February, 2000) but whether they overlap with Hoodsport Hatchery chinook when these fish are released in May is unknown. Predation risks to bull trout from hatchery chinook are likely to be low, since the smallest native char juveniles are likely to be found in the uppermost portions of the Skokomish watershed. By the time South Fork fluvial or possibly anadromous char reach lower river reaches where they are more likely to overlap with hatchery juveniles, they may be too large to be preyed upon. Spawning grounds of South Fork bull trout have not been identified in detail, but are unlikely to overlap with those of fall chinook, so competitive interactions on spawning grounds are unlikely to occur.

Bull trout from the North Fork Skokomish (Lake Cushman and Upper North Fork stocks) are unlikely to pass through the hydropower projects to interact with Hoodsport Hatchery chinook.

SECTION 4. WATER SOURCE

4.1) Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

Hoodsport Hatchery: Water for rearing fall chinook fingerlings at Hoodsport Hatchery comes from Finch Creek. The water right for Finch Creek is 17.4 cubic feet per second (cfs). Finch Creek is mostly spring-fed with additional run-off during rainy periods. Flows vary from 15 to 30 cfs with water temperatures ranging from 41 to51 degrees Fahrenheit. Water quality in Finch Creek has deteriorated because of failing septic systems along Finch Creek. This has resulted in a beach closure to shellfish harvest at the mouth of Finch Creek due to pollution. Saltwater is supplied to Hoodsport Hatchery via two 20 HP vertical turbine pumps capable of pumping 2000 gallons per minute (gpm). Seawater is drawn through a pipeline connected to an intake located 80 feet deep in Hood Canal. Water right for the seawater is 8.8 cfs. Seawater from Hood Canal is added to the release ponds approximately 3 days prior to release. This is done in order help acclimate the fingerlings to Hood Canal salinity thus improving survival.

Hoodsport Hatchery operates under NPDES permit WAG-1011. There is no pollution abatement pond. Vacuumed pond wastes are applied to the property next to the hatchery. Hatchery effluent does not violate the conditions of the NPDES permit. All intake screens

meet NMFS and WDFW screening criteria.

4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

Intake screens meet both NMFS and WDFW screening guidelines at Hoodsport Hatchery. This should minimize the risk that wild juvenile chinook might enter the freshwater intakes. Hoodsport Hatchery pond cleaning effluent is pumped onto a private upland disposal site and does not re-enter state waters. Hoodsport operates in compliance with NPDES discharge permit guidelines.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Hoodsport Hatchery: Broodstock are collected by installation of removable racks installed in a permanent weir in Finch Creek. Fish enter an adjacent fish ladder that leads them to three adult holding raceways with dimensions of 13' x 205' X 5'. The racks are installed on August 1 and removed in early December at the conclusion of the chum run.

5.2) Fish transportation equipment (description of pen, tank truck, or container used).

Hoodsport Hatchery: It is not typically necessary to transport adult broodstock on site, however, they are transported in a 400 gallon planting tank with supplemental oxygen and recirculation motors when necessary.

5.3) Broodstock holding and spawning facilities.

Hoodsport Hatchery: Adult broodstock are held in adult holding raceways until they are spawned. Spawning facilities are located at the head end of the adult raceways.

5.4) Incubation facilities.

Hoodsport Hatchery: Hood Canal fall chinook eggs are incubated to the eyed stage in vertical stack incubators at 5 lbs./tray. Then they are shocked ,picked, and enumerated back into the vertical incubators at 5 lbs. per tray (approximately 9000 chinook eggs per tray) and artificial substrate is added to the trays for hatching.

5.5) Rearing Facilities

Hoodsport Hatchery: After hatching, chinook fry are removed from the vertical incubators and placed in 7- 20' X 80' X 2.5' raceways at a maximum rearing density of .85 pounds per cubic foot (lbs/cu. ft.). at which point they are transferred to the release ponds.

5.6) Acclimation/release facilities.

Hoodsport Hatchery: As they grow, chinook juveniles are split into the combination adult holding/juvenile release ponds (15 A,B, &C) and 3 raceways for rearing in ambient Finch Creek water. Seawater is pumped into these ponds for approximately 1 week prior to release to acclimate the fish to seawater. Fingerlings accustomed to seawater prior to release tend to disperse more evenly and quickly from Finch Creek release site than fish which are not acclimated to seawater. Hatchery exposure to seawater is limited to approximately 1 week to reduce the risks of vibrio (Vibrio anguilarum sp.) outbreaks. Maximum density at release is 1.35 lbs/cu. ft.

5.7) Describe operational difficulties or disasters that led to significant fish mortality.

None in recent years.

5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

Hoodsport Hatchery is staffed full time with resident professional staff. The hatchery is equipped with alarm systems and backup generator to provide auxiliary power in the event of a power failure.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1) Source.

Hoodsport stock was started in 1952 with a release of Dungeness Hatchery spring /summer chinook. This was followed by several years of Soos Creek Hatchery (Green River) releases until the stock became (largely) self sustaining. Additional inputs include chinook from Tumwater Falls (largely derived from Soos Creek), Voights Creek (Puyallup basin), Big Beef Creek, Minter Creek and Trask River (Oregon) hatchery populations. The actual contribution of these individual hatcheries stocks to the Hoodsport stock is unclear. Genetic analysis of the Hoodsport population showed similarities to the Marblemount (Skagit) Hatchery fall chinook population, which may reflect the mixed origin of both populations.

WDF&W shall continue the use of gametes procured from fall chinook salmon adult volunteering to the Hoodsport Hatchery to effect their respective programs.

6.2) Supporting information.

6.2.1) History.

The Green River fall chinook stock originated from adults collected in the Green River. The stock was propagated at the Soos Creek Hatchery and disseminated widely throughout Puget Sound hatcheries. The hatchery began operation in 1901 and we assume that fall chinook broodstock collection began at that time.

Dungeness chinook are a spring/summer stock native to the Dungeness. They were not successfully introduced at Hoodsport and may not have contributed significantly to the George Adams/Hoodsport stock.

The Voights Creek stock originated from Voights Creek chinook but had significant infusions of Soos Creek fish. The Minter Creek fall chinook stock is a Soos Creek derivative. We do not know the origins of the Trask River chinook stock. These fish were incorporated into the Hoodsport stock because they tend to be large.

Hoodsport Hatchery has been self sufficient for 11 of the past 13 years (1988 to 2000). No intentional selection for any characters such as size or run timing has been conducted.

6.2.2) Annual size.

Wild chinook are not intentionally collected for broodstock. It is not possible to distinguish wild chinook from unmarked hatchery fish. If wild chinook enter the trap and adult holding pond, they will likely be spawned. The number of wild fish spawned, if any, is not known. Broodstock size is 2,220 adults for programmed egg take.

6.2.3) Past and proposed level of natural fish in broodstock.

Unknown

6.2.4) Genetic or ecological differences.

Unknown

6.2.5) Reasons for choosing.

The Hoodsport Hatchery broodstock is selected at random from Hoodsport Hatchery returns.

6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

Not applicable.

SECTION 7. BROODSTOCK COLLECTION

7.1) Life-history stage to be collected (adults, eggs, or juveniles).

Adults

7.2) Collection or sampling design.

WDF&W shall procure gametes from adults volunteering to Hoodsport to effect the programs at those particular sites.

Adult broodstock are collected at tidewater by installation of racks in Finch Creek, thus blocking upstream passage of adults. This forces adult broodstock to enter the fish ladder where they are trapped, sorted and held in three concrete raceways. The trap at Hoodsport Hatchery is open from August 1 through the first week of December. The fall chinook are trapped between August 1 and mid-September. The trap consists of an instream weir with a removable rack to allow upstream passage between the 2nd week of December and July 31st. On "odd numbered" years, when pink salmon are returning, the barrier is installed the end of June. When the racks are installed fish are diverted to the adjacent fish ladder which leads them into the adult holding raceways. Fish can be diverted into any 1 of 3 raceways and kept separate based on run timing, species, etc. There are no known features of this trap which would lead to the collection of a non-representative sample of broodstock. The trap is only temporarily closed when the maximum carrying capacity is reached.

7.3) Identity.

Unmarked hatchery-origin chinook cannot presently be distinguished from wild fish.

7.4) Proposed number to be collected:

7.4.1) Program goal (assuming 1:1 sex ratio for adults):

For Hood Canal the egg-take goal is 3.6 million fall chinook eggs. Assuming a fecundity of 4,500 eggs per female and a 60% male / 40 % female sex ratio, and a prespawning mortality of < or = 5%, the number of adults required to meet the eggtake goal would be about 2,100.

7.4.2) Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:

Hoodsport Hatchery:

Year	Adults Males	Females	Jacks	Eggs	Juveniles
1988	3,200	2,059	35	8,932,000	
1989	1,598	1,904	20	8,404,000	
1990	777	434	10	1,875,000	
1991	1,449	1,118	15	5,249,000	
1992	564	367	7	1,608,500	
1993	1,226	779	15	3,468,000	
1994	980	886	12	3,780,000	
1995	702	864	18	3,888,000	
1996	1,346	1,271	39	5,426,600	
1997	2,080	1,994	9	8,293,800	
1998	1,631	1,595	8	6,661,400	
1999	804	860	10	3,322,000	
2000	993	861	16	3,990,000	
2001	508	511	20	2,303,150	

7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.

All returning fall chinook are trapped at the Hoodsport Hatchery. There are no allowable upstream escapement levels at Hoodsport. Adult fall chinook males in excess of a 1:1 ratio with females are killed and sold to the contract vendor or donated for tribal ceremonial use, food banks, nutrient enhancement, etc. Females with green, bloody, or water-hardened eggs are culled out of the spawning population. Ripe females, in excess of program need, are sold or donated in the same manner as excess males.

7.6) Fish transportation and holding methods.

Not transported.

7.7) Describe fish health maintenance and sanitation procedures applied.

Fish health measures are consistent with the Co-Managers Fish Health Policy (NWIFC and WDFW 1998).

7.8) Disposition of carcasses.

The disposition of chinook carcasses at Hoodsport Hatchery depends upon the condition of the carcasses and whether the fish had been treated with drugs. Drug-treated fish are buried on station or in a local landfill. Carcasses of untreated fish, both spawned and unspawned, may be sold to a contracted buyer, donated to a food bank or donated to the Forest Service nutrient enhancement program.

7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

No special risk aversion measures are in place to protect listed wild fish since unmarked hatchery and wild fish cannot be distinguished.

SECTION 8. MATING

Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.

8.1) Selection method.

All ripe fish are selected randomly for spawning from available broodstock.

8.2) Males.

Males are selected randomly and their gametes pooled in 5 fish units. They are mated 5 X 5 with the females. Jacks are spawned at no more than 2 % of the total males as required by the WDFW Hatchery Spawning Guidelines (Seidel 1983).

8.3) Fertilization.

Eggs are collected in 5 female pools and pooled milt is mixed, (5 x 5) and allowed to set for 10 minutes. Fertilized eggs are pooled and taken to the hatchery for distribution into the incubators. All eggs are disinfected with iodine at 100 ppm for 1 hour during water-hardening as required by the Co-Managers Salmonid Disease Control Policy (1998).

8.4) Cryopreserved gametes.

Not used.

8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

No wild-origin adults will be knowingly spawned.

SECTION 9. INCUBATION AND REARING -

Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

9.1) Incubation:

9.1.1) Number of eggs taken and survival rates to eye-up and/or ponding.

Hood Canal:
Green Egg to Fry Survival: Range of 92.0% to 96.2%
Fry to Fingerling Smolt Survival: Range of 86.8% to 98.8%

9.1.2) Cause for, and disposition of surplus egg takes.

Egg takes shall be managed to limit the likelihood of surplus eggs.

9.1.3) Loading densities applied during incubation.

Hoodsport Hatchery green eggs are eyed in vertical incubators at 5.5 lbs. per tray and hatched at 7,500 eggs per tray in artificial substrate with an inflow of 4 gpm. Average green egg size is 1,700 eggs per pound.

9.1.4) Incubation conditions.

At Hoodsport Hatchery eggs are incubated and hatched on surface water from Finch Creek. Incubator trays are "rodded" as needed during dirty water conditions. Temperatures during incubation vary from 41 to 45 degrees Fahrenheit. Water flows are visually checked daily.

9.1.5) Ponding.

Fry are forced ponded when yolk absorption is 95 %+ complete. At Hoodsport Hatchery ponding occurs between January 1 and the first week of February. Accumulated Temperature Units (TU's) at ponding are1,680.

9.1.6) Fish health maintenance and monitoring.

Eggs at Hoodsport are treated with Paracide-F (Formalin) at a rate of 1: 600 for 15 minutes daily beginning 24 hours after spawning until 3 days prior to hatching. Fish health is monitored on a routine basis by the Area Fish Health Specialist. If needed, treatment plans are prescribed in accordance with the WDFW Fish Health Manual and Policies.

9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

NA

9.2) Rearing:

9.2.1) Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available.

Hood Canal:
Green Egg to Fry Survival: Range of 92.0% to 96.2%
Fry to Fingerling Smolt Survival: Range of 86.8% to 98.8%

9.2.2) Density and loading criteria (goals and actual levels).

In general, loading and density levels conform to standards and guidelines set forth in Piper, et. al., 1982.

9.2.3) Fish rearing conditions

Hoodsport Hatchery fish are reared in ambient surface water from Finch Creek and then acclimated to seawater a week prior to release to minimize stress of seawater entry (there is no buffering estuary at Hoodsport). Waste is vacuumed out of raceways weekly. Release ponds cannot be cleaned during rearing. Pond flows are measured weekly and feed levels adjusted accordingly. Mortality is removed daily and screens are cleaned daily. Maximum and minimum temperatures are also measured daily. Loadings are kept at or below standards set forth in Piper, et al., 1982.

9.2.4) Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

Not available.

9.2.5) Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

NA

9.2.6) Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

Fish are reared on a diet of Bio Oregons' Bio-Diet Starter and Grower feed at rates between 1.7 and 2.5% B.W./day.

9.2.7) Fish health monitoring, disease treatment, and sanitation procedures.

See 9.1.6

9.2.8) Smolt development indices (e.g. gill ATPase activity), if applicable.

Physical appearance and behavior are used to judge smolt development.

9.2.9) Indicate the use of "natural" rearing methods as applied in the program.

None.

9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

NA

SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program.

10.1) Proposed fish release levels.

The core fall chinook program at Hoodsport is a release of 3.0 million fingerling smolts, to be released in mid-May at a size of 80 fish per pound (fpp) (1999 Current Brood Document). Samples of fish are weighed and measured prior to release to estimate the coefficient of variation in size. The goal of the rearing program is to attain a coefficient of variation for weight/length of 10.0 or less in order to decrease the likelihood that the

growth and development of some fish will be retarded. Such fish would be more likely to residualize in fresh water.

Table. Core chinook program at Hoodsport Hatchery showing on-station fingerling releases

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				
Fry				
Fingerling	3,000,000	60-80	May	Finch Creek
Yearling				

Data from 1999 Current Brood Document.

10.2) Specific location(s) of proposed release(s).

Stream, river, or watercourse: Finch Creek (16.0222)
Release point: Finch Creek at its' confluence with Hood Canal
Major watershed: Hood Canal
Basin or Region: Hood Canal (Puget Sound)

10.3) Actual numbers and sizes of fish released by age class through the program.

Hood Canal Hatchery:

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1988					1,679,800	42 fpp		
1989					1,705,400	47 fpp		
1990					828,500	68 fpp		
1991					863,700	59 fpp		
1992					876,500	66 fpp		
1993					809,900	64 fpp		
1994					834,100	65 fpp		
1995					1,755,954	69 fpp		
1996					2,758,150	71 fpp		
1997					4,241,748 114,225	78 fpp 82 fpp		
1998					3,168,896	75 fpp		

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1999					2,911,637 113,759	77 fpp 22 fpp		
2000					3,110,853	80 fpp		
2001					3,059,892	76 fpp		
Average					1,802,063	65 fpp		

Data source: WDFW Hatcheries data base. 1988-1994 data are from Plants table. 1995-1999 data are from form 4 table.

10.4) Actual dates of release and description of release protocols.

Hoodsport Hatchery chinook are forced released in mid-May due to water and pond constraints. Seawater is pumped into the release ponds for approximately 1 week prior to release to acclimate the fish to seawater. Fingerlings accustomed to seawater prior to release tend to disperse more evenly and quickly from Finch Creek release site than fish which are not acclimated to seawater. Hatchery exposure to seawater is limited to approximately 1 week to reduce the risks of vibrio (Vibrio anguilarum sp.) outbreaks. Maximum density at release is 1.35 lbs/cu. ft.

10.5) Fish transportation procedures, if applicable.

Not applicable

10.6) Acclimation procedures.

See 10.4 Finch Creek is the freshwater source for the Hoodsport Hatchery. The fish are reared on Finch Creek water until about a week prior to release. Seawater from Hood Canal is introduced into the raceways to acclimate the fingerlings to saltwater prior to release.

10.7) Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

With co-manager agreement , WDF&W will apply an identifiable mark to 100% of the fall chinook production released through the Hoodsport Hatchery program each year to allow monitoring and evaluation of the hatchery program fish releases and adult returns. Coded-wire tagging shall be applied to a portion of the fall chinook production to allow for evaluation of fishery contribution, survival rates and stray levels to other Puget Sound

watersheds.

10.8) Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.

Beginning with the 1999 brood year, any excess Hoodsport chinook fry (resulting from higher than expected survival) will be released into landlocked lakes in the Hood Canal area following consultation with the tribes.

10.9) Fish health certification procedures applied pre-release.

Each lot of fish is examined by a WDFW Fish Health Specialist prior to release or transfer, in accordance with the Co-Managers Salmonid Disease Policy.

10.10) Emergency release procedures in response to flooding or water system failure.

In the event of a water system failure, screens would be pulled to allow fish to exit the pond. In some cases they can be transferred into other rearing vessels to prevent an emergency release. WDFW also has emergency response procedures for providing back-up pumps, transport trucks, etc. in cases of emergency. In cases of severe flooding the screens are not pulled because flood waters rise to the point where they breach the ponds. Past experience has shown that the fish tend to lay on the bottom of the pond during flooding events and only those that are inadvertently swept out are able to leave.

10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

Fingerling chinook released from Hoodsport are acclimated to seawater prior to release in mid-May. This causes the fingerlings to disperse quickly and not concentrate in the near-shore waters post-release. This may serve to minimize near-shore interactions with wild chinook. In addition, releasing subyearling smolts should reduce the likelihood of hatchery fish preying on wild chinook since wild chinook are expected to be nearly as large as the hatchery fish at the time of release.

We know nothing about saltwater interactions between hatchery chinook and listed wild chinook and summer chum, but we expect that wild summer chum would have cleared lower Hood Canal before the chinook are released.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

11.1) Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

Note: See section 1.10 for Monitoring and Evaluation. The purpose of a monitoring program is to identify and evaluate the benefits and risks which may derive from the hatchery program. The monitoring program is designed to answer questions of whether the hatchery is providing the benefits intended, while also minimizing or eliminating the risks inherent in the program. A key tool in any monitoring program is having a mechanism to identify each hatchery production group.

Each production group shall be identified with distinct otolith marks, adipose clips, coded wire tags, blank wire tags or other identification methods as they become available, to allow for evaluation of each particular rearing and/or release strategy. This will allow for selective harvest on hatchery stocks when appropriate, monitoring of interactions of hatchery and wild fish wherever they co-mingle in riverine, estuarine and marine habitats and assessment of the status of the target population. WDFW shall monitor the Chinook salmon escapement into the target and non-target Chinook populations to estimate the number of tagged, un-tagged and marked fish escaping into the river each year and the stray rates of hatchery Chinook into the rivers.

11.1.1) Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

Benefit Indicator 1: Achieve broodstock/eggtake goals to provide fish for stable, predictable fishery

The maximum number of spawners needed to meet the eggtake has been determined to be 2,220 (890 females and 1,330 males). Because fish are not sorted by sex at the time they enter the adult pond from the trap, more than 2,220 chinook will be collected to assure that the program needs are met. The number of spawning days is planned in advance, based on typical return timing. The number of males and females to be spawned on each day can be determined. The risk is that the number of females will fall short of the number needed and eggtake will be less than required.

Egg takes are estimated at the time of spawning and refined after shocking and picking.

Benefit Indicator 2: Communicate within WDFW and with tribes, citizen groups, private citizens and federal agencies regarding program goals and production objectives. Meet ESA recovery requirements and Wild Salmonid Policy requirements.

There is no formal process for reviewing program goals and production objectives. Typically WDFW Region 6 staff and PNPTC/tribal staff communicate if production changes are proposed. Production changes involving the regional fish enhancement group or volunteer co-op groups are communicated through the WDFW Cooperative

Extension, Outreach and Partnership Program. The changes in goals and production levels which result from these discussions are reflected in the Future Brood Document compiled by WDFW. Recently NMFS has also become involved in discussions of changes to production at Hoodsport hatchery affecting the regional fish enhancement group program.

WDFW and NMFS are engaged in discussions of hatchery chinook production and release in Hood Canal to ensure that agency hatchery programs to be consistent with recovery requirements. Aspects of hatchery physical plant and operations which may conflict with the Wild Salmonid Policy will be reviewed by WDFW staff assigned to implement the policy.

Risk Indicator 1: Reduce hatchery broodstock collection impacts on wild fish

In order to minimize collection of wild chinook for spawning, they must be separable from all hatchery chinook and they should be returned to the Skokomish River. This is currently not possible for two reasons. First, we cannot currently distinguish unmarked hatchery fish from wild fish. Second, we have no way to physically separate hatchery and wild fish entering the hatchery. There is no sorting capability either at the adult trap or in the adult holding pond.

The problem of distinguishing wild from hatchery fish could be solved by marking all hatchery fish. The state and the PNPTC tribes are discussing the need to mass mark chinook in Hood Canal. The problem of separating hatchery and wild fish once they can be identified could be solved if the adult pond could be divided and a sorter were installed at the trap or the entrance to the pond. Once wild fish can be sorted from hatchery fish, they can be returned to the Hood Canal for release. We must be aware, however, that even with mass marking, a small number of unmarked hatchery fish may return depending on the proportion of "bad clips or marks" at the time of marking.

Risk Indicator 2: Reduce interactions between hatchery and wild juvenile fish.

This would require monitoring of hatchery smolts following release from Finch Creek and determination of the temporal and spatial distribution of juvenile hatchery fingerlings and wild salmonids.

Risk Indicator 3: Maintain hatchery stock integrity and genetic diversity.

This requires that no chinook from outside the Hood Canal region be introduced into Hoodsport Hatchery. It also requires that the spawning population be sufficiently large to avoid significant effects of genetic drift and that spawners represent the entire run timing.

Risk Indicator 4: Meet disease prevention and control standards in Co-Managers Salmonid Disease Policy.

This requires that measures prescribed for examining fish to be transferred or released be followed, that routine health inspections be conducted and that disease outbreaks be contained quickly.

11.1.2) Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

Funding and resources are currently committed to monitor and evaluate this program as detailed in the Resource Management Plan for Puget Sound Chinook Salmon Hatcheries (Washington Department of Fish and Wildlife and Puget Sound Treaty Tribes, August 23, 2002).

Benefit Indicator 1: Staff and funding to count hatchery adult returns and determine eggtake needs are available.

Benefit Indicator 2: Staff and funding are available to carry out discussions of production programs at Hoodsport and to make changes to the Future Brood Document to reflect those changes.

Risk Indicator 1: Funding in not currently available to construct a means of separating wild and hatchery fish at the hatchery.

Risk Indicator 2: The staff, funding and logistical support are not available to undertake monitoring of hatchery smolts, determination of the extent to which they overlap with wild fish and the effect of that overlap.

Risk Indicator 4: Disease prevention and control measures are monitored in the monthly fish health reports for Hoodsport Hatchery.

Risk Indicator 5: Water quality is monitored in the monthly Discharge Monitoring Report, part of the NPDES permit reporting requirements.

11.2) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

It is anticipated that adherence to monitoring and evaluation protocols will not elevate risk to listed chinook salmon.

SECTION 12. RESEARCH

The only research being conducted in direct association with the Hoodsport Hatchery fall chinook program was genetic analysis of a sample of adults at the hatchery during the 1999 spawning season.

12.1) Objective or purpose.

To determine the genetic relationship between the Hoodsport and George Adams hatchery fall chinook stocks and naturally-spawning fish in the Skokomish, Hamma Hamma, Duckabush, Dosewallips and Quilcene rivers.

Sampling at Hoodsport Hatchery was conducted in 1999. Further hatchery sampling will probably not occur until 2003 or 2004 (the next generation of chinook).

12.2) Cooperating and funding agencies.

WDFW with some funding from the Pacific Salmon Treaty.

12.3) Principle investigator or project supervisor and staff.

Anne Marshall, Genetics Unit, WDFW conducts the analyses. Rick Ereth, WDFW Genetics Unit, coordinates sample collection by WDFW Genetics Sampling crew members, WDFW regional Fish Program staff or hatchery staff.

12.4) Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

See section 2.

12.5) Techniques: include capture methods, drugs, samples collected, tags applied.

The Genetics Sampling crew or hatchery staff removes tissue samples (heart, eyefluid, liver, muscle and fin or operculum) for allozyme and DNA analysis from fresh chinook carcasses at the hatchery. Typically tissue samples are obtained from 100 chinook (50 females and 50 males) taken throughout the run and spawn timing.

The Genetics Sampling Crew and/or regional Fish Program staff snag spawned out chinook and kill them by a blow to the head or sample recently dead chinook (gills still red) on spawning grounds in the streams listed above.

12.6) Dates or time period in which research activity occurs.

Tissue collection at the hatchery occurs on spawning days from mid-September through late October. Tissue collection in the field occurs during the same time period.

12.7) Care and maintenance of live fish or eggs, holding duration, transport methods.

Not applicable.

12.8) Expected type and effects of take and potential for injury or mortality.

Hatchery fish are dead at the time of sampling. Currently all field-sampled fish are killed prior to tissue collection.

12.9) Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).

The level of lethal spawning and subsequent sampling of liste (wild) chinook at the hatchery is unknown but is likely less than 100 fish, since the entire sample is 100 fish. The level of take of fish on the spawning grounds would not exceed 100 fish in each major drainage.

12.10) Alternative methods to achieve project objectives.

If NMFS determines that killing spawned out and moribund fish on spawning grounds cannot be continued, genetic analysis could continue using fin clips from live fish. Some allozyme analysis has been conducted on fin tissue from chinook, but such a change in sampling would likely result in a change from allozyme to DNA analysis. If the take incurred during this sampling were judged acceptable to NMFS, and if WDFW were able to install a weir or trap to collect live fish, sampling could continue. However, it should be noted that the baselines for DNA would not be comparable to those available for allozymes for some time to come.

12.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

None.

12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed

research activities.

None.

SECTION 13. ATTACHMENTS AND CITATIONS

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Washington Department of Fish and Wildlife and Point No Point Treaty Tribes. 2000. Summer Chum Salmon Conservation Initiative: An Implementation Plan to Recover Summer Chum Salmon in the Hood Canal and Strait of Juan de Fuca Region. Jim Ames, Gary Graves, and Chris Weller, editors. Fish Program, Washington. Department of Fish and Wildlife, Olympia. 423 p. + app.

SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

Table 1. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Chinook ESU/Population: Puget Sound Activity: Hatchery program				
Location of hatchery activity: Hoodsport Hatchery (Hood Canal) Dates of activity: September - August Hatchery program operator: WDFW				
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)				
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)			Unknown	
Intentional lethal take f)				
Unintentional lethal take g)	Unknown	Unknown	Unknown	
Other Take (specify) h)				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.